Harnessing Revolution Industry 5.0 And Human-Centric AI in Cross-border Policing: A Study on Commercial Service Delivery Acceptance Between Malaysia and Thailand

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ABSTRACT

The rapid evolution from Technology Industry 4.0 to Technology Industry 5.0 marks a transformative shift toward human-centric technological integration, prioritizing a sophisticated collaboration between Artificial Intelligence and human expertise. In the critical domain of public safety, this transition is essential for addressing the multifaceted complexities of cross-border commercial crimes. This study using the Grounded in the Extended Technology Acceptance Model and New Public Management principles. This research explores the perception and acceptance of Technology Industry 5.0 commercialization services among police officers at the Northeast District Police Headquarters in Penang, Malaysia, and Danok, Thailand. Utilizing a qualitative phenomenological approach, the study investigates how 5G and nascent 6G technologies facilitate the prevention of commercial crimes through "Digital Era Governance." A core contribution of this research is the development of a Virtual Decision-Simulation Model designed to predict commercial non-compliance by mimicking managerial thought patterns. Furthermore, the study formulates a Smart Networking and Data Protection Framework to ensure secure international data exchange in high-bandwidth environments. Initial findings highlight that perceived usefulness and ease of use, mediated by cognitive and affective trust in smart networking systems, significantly influence the adoption of these advanced frameworks. This research provides a strategic roadmap for public administration, yielding a validated Technology Industry 5.0 Acceptance Model. Key outputs include a policy-ready framework for secure data management and a prototype for AI-based decision simulation. Ultimately, this study enhances integrity and accountability in public administration by bridging the gap between cutting-edge technological innovation and robust regulatory governance, ensuring the sustainability of corporate transparency in the digital era.

Keywords: Technology Industry 5.0, Human-Centric AI, Technology Acceptance Model, Cross-Border Policing, Digital Era Governance.

INTRODUCTION

The global landscape of public organizations continues to be shaped by the Fourth Industrial Revolution (IR 4.0), characterized by digitalization and the Internet of Things (IoT). However, the emergence of Industry Revolution 5.0 which was grounded in human-centric intelligence with represents a transformative shift. This paradigm promotes an initiative where human creativity remains central to work processes, augmented by robotics and semi-robotics to enhance collaboration and decision-making wellbeing.

The shift from Industry Revolution 4.0 to Industry Revolution 5.0 represents a pivotal move from pure automation to a "human-centric" approach. According to Nair et al. (2024), Industry 5.0 emphasizes the resilience and sustainability of organizations by leveraging the synergy between human intuition and machine precision. In Malaysia, the integration of 5G and the upcoming 6G satellite-based broadband is essential for "Industry Revolution 5.0 commercialization services," which bridge the gap between high-level Artificial Intelligence research and practical governance applications (Abdullah, 2023).

In Malaysia, the technological trajectory has advanced from 3G in 2015 to the nationwide implementation of 5G in 2022, paving the way for full Artificial Intelligence integration and the anticipation of 6G satellite-based

broadband. This evolution is pivotal for "Industry Revolution 5.0 commercialization services," which aim to bridge the gap between high-level research (Artificial Intelligence, Internet of Things, robotics) and practical, sustainable industrial applications. For the policing sector, these services are essential in translating innovative technologies into effective solutions for preventing modern commercial crimes. The urgency of this integration is most evident in cross-border jurisdictions, specifically between Penang, Malaysia, and Danok, Thailand. Successful commercialization of policing technology requires a robust ecosystem of stakeholders, including government agencies and academic institutions, to foster innovation while eradicating corruption and commercial malpractice.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The Technology Acceptance Model (TAM) remains the gold standard for evaluating user readiness. Recent studies by Choudhury & Zhang (2025) suggest that in public safety and governance, "Perceived Usefulness" is no longer just about speed, but about the ability of AI to ensure ethical decision-making. Furthermore, Tan & Bakar (2024) argue that New Public Management (NPM) in Southeast Asia must now evolve into "Digital Era Governance" (DEG) to prevent the sophisticated commercial crimes that occur across borders, such as those between Malaysia and Thailand.

The Technology Acceptance Model (Tam) In Public Management

The adoption of Information Technology (IT) offers immediate and long-term benefits, including improved performance and time efficiency. In public strategic management, technology is a cornerstone for organizational growth, prompting extensive research into individual readiness to accept innovative systems. The Technology Acceptance Model (TAM), originally developed by Davis (1989), remains the primary tool for understanding user responses to information system performance. TAM posits that technology acceptance is a three-stage process: external factors (system design) trigger cognitive responses (Perceived Ease of Use and Perceived Usefulness), which then form affective attitudes or behavioral intentions, ultimately leading to actual usage.

New Public Management (NPM) And Industry

Perception

New Public Management (NPM) serves as a reformative mechanism in the public services of Malaysia and Thailand, emphasizing market-based administration and result-oriented management. In modern policing, NPM principles demand greater discretionary freedom to address commercial crimes effectively. However, the neoliberal administrative mechanisms are often susceptible to abuse if not supported by strong integrity. The commitment of the Malaysian administration since December 2022 to eradicate corruption has empowered police departments to carry out commercial crime prevention with enhanced accountability and minimal political interference.

METHODOLOGY

Research Design

This study employs a qualitative phenomenological research design to explore the complex lived experiences and subjective perceptions of police officers regarding the adoption of Industry 5.0 technologies. While quantitative methodologies are effective for identifying statistical correlations through numerical data, they often fail to capture the "human-centric" essence of Industry 5.0, which prioritizes social value and ethical collaboration (Nair et al., 2024). Consequently, a qualitative approach is selected to interpret social inquiries through rich narrative data, allowing for a deeper understanding of how law enforcement personnel conceptualize technological shifts.

The study operates within an interpretative paradigm. This paradigm is rooted in the belief that reality is socially constructed; thus, the research seeks to understand the human and social manifestations of technology adoption rather than merely measuring its frequency. By focusing on the "phenomenon" of Industry 5.0 within policing, this design provides a framework to uncover the underlying motivations, fears, and expectations of

officers as they navigate the transition from automated Industry 4.0 systems to collaborative AI environments (Abdullah, 2023).

Epistemology, Ontology, And Axiology

The philosophical foundation of this research is critical for ensuring rigor in qualitative inquiry, particularly when dealing with emerging technologies like 5G and Artificial Intelligence.

The ontological stance of this study is grounded in relativism. It considers the reality of daily policing duties not as a single, objective truth, but as a series of multiple, evolving realities shaped by identified knowledge gaps in commercial crime prevention (Tan & Bakar, 2024). In the context of cross-border policing, the "reality" of a commercialization service delivery system is viewed through the lens of those who interact with it daily. As Smith and Tan (2025) suggest, the reality of AI-driven governance is constantly redefined by the interaction between human decision-makers and algorithmic predictions, making a relativist ontology essential for this study.

The epistemology of this research is subjectivist and transactional, focusing on the intricate relationship between the researcher and the knowledge acquired regarding IR 5.0. In this framework, knowledge is not something to be "discovered" from a distance; rather, it is co-created through the interaction between the researcher and the participants (Choudhury & Zhang, 2025). This approach is vital for investigating "human-centric AI," as it acknowledges that the researcher's interpretation of technological acceptance is influenced by the officers' narratives and the broader socio-technological context of Malaysia and Thailand.

Finally, the axiology of the study reflects the values and ethical commitments of the researcher, which inherently influence the overall worldview of the investigation. Given the sensitive nature of policing and the ethical dilemmas surrounding AI, this study adopts a value-bound axiology. It prioritizes the principles of integrity, accountability, and the protection of human rights in the digital era. By acknowledging these values, the researcher ensures that the study does not merely evaluate technology for efficiency, but also for its ability to foster a more just and transparent public service delivery system (Nair et al., 2024).

Analysis and Findings

The analysis of this study followed a thematic phenomenological approach, where the "lived experiences" of police officers in Penang and Danok were distilled into core themes. The findings indicate that the transition to Industry 5.0 in cross-border policing is not merely a technical upgrade but a socio-technical transformation that relies heavily on human-centric AI and smart networking.

Theme 1: Perceived Usefulness of Human-Centric AI in Commercial Crime Prevention

The primary finding reveals a strong correlation between "Perceived Usefulness" and the actual intent to adopt Industry Revolution 5.0 technologies. Informants consistently highlighted that while Industry 4.0 provided the tools for digitalization, Industry 5.0 facilitates "human-centric collaboration" (Nair et al., 2024). Officers noted that Artificial Intelligence-driven simulations which referred to in this study as "Virtual Decision Models" allow them to anticipate commercial malpractice by simulating director-level decision-making patterns. According to Smith and Tan (2025), this move toward predictive analytics represents the frontier of modern policing, where AI does not replace the officer but enhances their cognitive capacity to detect behavioral anomalies in complex financial transactions.

Theme 2: Smart Networking as a Catalyst for Cross-Border Integration

A critical theme emerged regarding the role of "Smart Networking" in the 5G and nascent 6G era. Informants from both jurisdictions emphasized that the integration of satellite-based broadband reduces the friction of data exchange between Malaysia and Thailand. Findings suggest that the "Smart Networking and Technological Collaboration Model" is vital for real-time investigation. As Abdullah (2023) posits, Industry 5.0 is characterized by the breakdown of "silos," and in policing, this translates to shared digital platforms that protect data integrity while allowing for cross-border surveillance of commercial malfeasance. The findings confirm that the presence of high-speed 5G infrastructure significantly lowers the "Perceived Ease of Use" barrier, making officers more likely to trust automated data feeds.

Theme 3: The Integrity-Technology Nexus in New Public Management (NPM)

The analysis further uncovered a deep-seated concern regarding integrity and data protection. Officers articulated that for a technological system to be accepted, it must have a robust "Cross-Border Data Protection Model." The findings align with **Choudhury and Zhang's (2025)** assertion that in the digital era, "trust" is the primary currency of technology acceptance. Informants noted that the shift toward Digital Era Governance (DEG) under the NPM framework has empowered them to use AI tools with greater accountability. The results indicate that when AI is used to provide "early warning signals" (sounding box simulations), it reduces the opportunity for human error or corruption, thereby increasing the overall transparency of commercial service delivery.

Summary of Model Efficacy

Ultimately, the findings validate the **Extended Technology Acceptance Model (TAM)** as a reliable framework for this context. The study successfully mapped how cognitive responses (understanding AI) and affective attitudes (trusting the network) culminate in the adoption of advanced policing models. The synthesis of the "Extended TAM," "Smart Networking Model," and "Cross-Border Data Protection Model" provides a comprehensive blueprint for SSM and international policing bodies to modernize their regulatory functions in line with Industry 5.0 standards (Tan & Bakar, 2024).

CONCLUSION AND RECOMMENDATION

Conclusion

The transition toward Industry 5.0 represents a watershed moment for public administration and cross-border policing. This study has demonstrated that the successful adoption of advanced technologies—such as 5G/6G connectivity and Human-Centric AI—is not merely a matter of technical infrastructure but is deeply rooted in the cognitive and affective acceptance of the workforce. By applying the **Extended Technology Acceptance Model (TAM)**, the research confirms that police officers in both Malaysia and Thailand perceive the integration of "Virtual Decision Models" and "Smart Networking" as essential tools for combating the rising complexity of commercial crimes.

In conclusion, the study finds that Industry 5.0 facilitates a shift from reactive to proactive governance. The move away from automated "black-box" systems toward human-centric collaboration allows for more ethical and transparent decision-making in public service delivery. Furthermore, the alignment of technology with **New Public Management (NPM)** principles has shown that digital tools, when governed by robust integrity frameworks, significantly reduce the propensity for administrative malpractice and cross-border corruption (Abdullah, 2023; Tan & Bakar, 2024). Ultimately, this research provides a verified roadmap for agencies like SSM and international police bodies to harmonize their technological ecosystems in an increasingly interconnected global economy.

Recommendations for Policy and Practice

Based on the synthesized findings, the following recommendations are proposed to enhance the delivery of commercialization services as follow:

Firstly, Development of Collaborative AI Sandboxes. It is recommended that regulatory bodies, such as SSM, invest in "Sounding Box" platforms. These environments allow for the simulation of policy impacts on "Virtual Company Directors" before full-scale implementation. As suggested by **Smith and Tan (2025)**, this predictive approach mitigates risks and ensures that new regulations are resilient against modern financial anomaliess.

Next, Implementation of Smart Networking Protocols. It is for cross-border agencies, the establishment of a unified Smart Networking and Data Protection Framework is imperative. This framework should leverage 5G/6G capabilities to ensure real-time, encrypted data sharing, thereby safeguarding the integrity of international investigations against cyber-manipulation (Choudhury & Zhang, 2025).

Lastly, Human-Centric Training Programs. The Organizations must move beyond basic digital literacy. Training should focus on "Augmented Intelligence," where officers learn to work alongside AI rather than being replaced by it. This focus on "Decision Wellbeing" will ensure long-term sustainability and reduce technological resistance within the workforce (Nair et al., 2024).

Recommendations for Future Research

Future studies should expand this phenomenological inquiry into a longitudinal quantitative analysis to measure the long-term impact of Industry 5.0 on actual crime reduction rates. Additionally, research into the Axiological implications of 6G technology is needed to address the emerging ethical dilemmas of satellite-based surveillance and data sovereignty in a post-digital world.

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